THE OHIO STATE UNIVERSITY
COLLEGE OF PUBLIC HEALTH

PUBHEHS 5315- Principles of Toxicology
3-credit hours-Spring 2019

Instructor: Darryl B. Hood, Ph.D., Associate Professor

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Class Time and Location: Tuesdays and Thursdays, 8:00 a.m.- 9:20 a.m. in **330 Cunz Hall**

Instructor's Office Hours: By appointment only

TA Name, Email and Office Hours:
David Hibler, Environmental Health Sciences Ph.D. Graduate Student
Office: Cunz Hall, Room 400-B
Email: hibler.10@buckeyemail.osu.edu
Office Hours: Tuesday from 2:30 PM to 3:30 PM and by appointment

Prerequisites: Students matriculated in the Bachelor of Science in Public Health (BSPH), Master of Public Health (MPH) and Doctor of Philosophy (PhD) degree programs and PhD Non-College of Public Health degree graduate students may register for this course. Students with a science background will find it helpful in navigating the subject matter.

TA Responsibilities: The TA assigned to this course will hold regular office hours and lead review sessions for any students who need help with class material. He/she may also assist with scoring homework and exams. The course coordinator, Dr. Hood, will assign final grades. Any questions regarding grading should always be directed to the course coordinator.

Course Description: This is an required core course for students pursuing the BSPH-Environmental Public Health (EPH), MPH-EH, MS-EPH and PhD-EPH degrees in the College of Public Health. This course is intended to provide EHS majors with *i*) overview of the general principles of toxicology, and *ii*) systems-based introduction to mechanisms of xenobiotic metabolism, absorption, excretion, and biotransformation of toxicants. Basic toxicological principles such as dose-response, metabolic pathways, and factors influencing toxicity will be presented. The concepts and principles of chemical carcinogenesis will also be reviewed. The most current concepts with regard to central nervous system, genetic and immunotoxicity will be reviewed. Additionally, examples of the current techniques utilized in the toxicological sciences will be reviewed. Toxicological mechanisms of action and the rationale for therapeutic measures against the effects of toxic chemicals, agents, and the basis for toxicological pathology will be presented. Lectures, demonstrations, case studies and student presentations are included.

Class Format: Dr. Hood is the course coordinator and will lead class discussions on a day-to-day basis. Occasionally, other EHS and outside expert faculty will give lectures. Lectures will introduce, reinforce, and compliment the required reading relating to the topic. Additional class sessions will focus on special EHS topics selected by student-working groups. These working groups will choose and present a relevant toxicology-related topic to be researched, presented and discussed at a formal oral presentation.

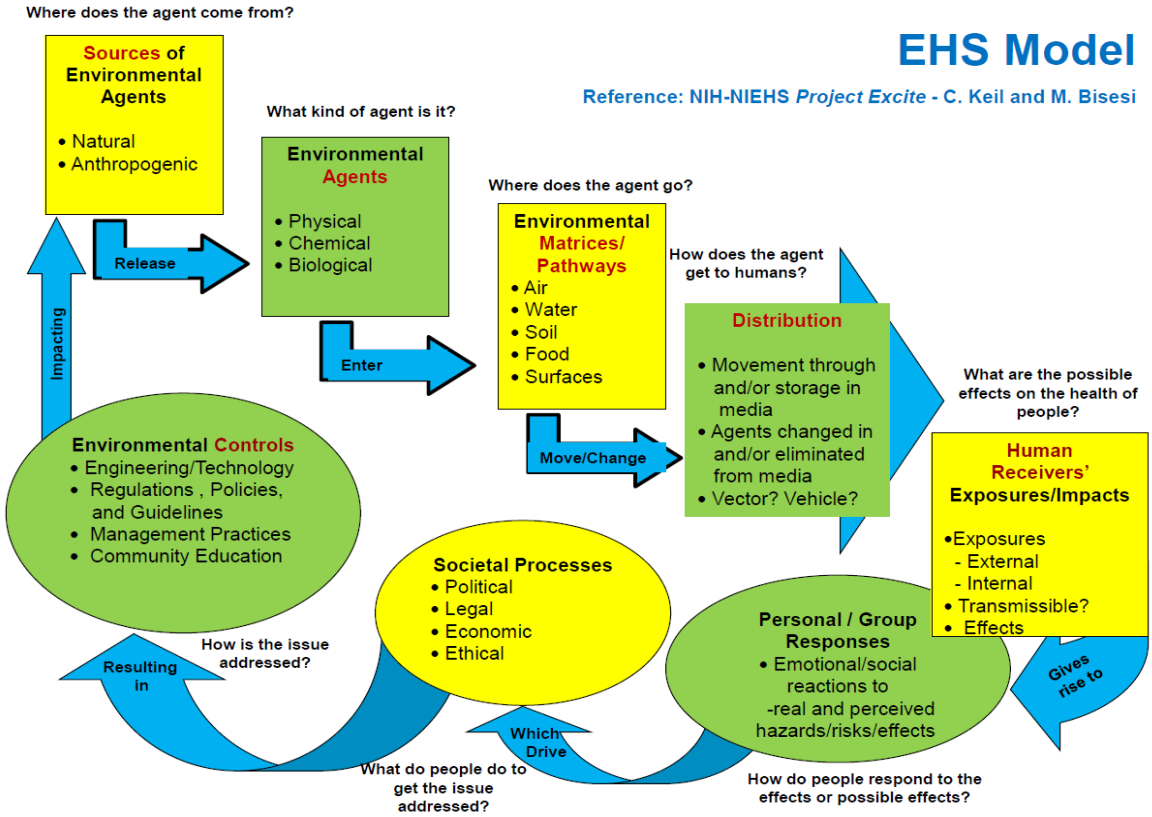

Figure 1. EHS model: components of the EHS model either inform or are informed by the risk assessment process

Course Objectives:
By the end of this course, students should successfully be able to:

1. Discuss basic toxicological concepts such as dose-response, biotransformation, metabolism and chemical carcinogenesis.
2. Outline the consequences from exposure to toxicants on biological systems.
3. Predict the relationship between the structure of chemical and target organ toxicity.
4. Identify and explain factors that influence absorption, distribution and elimination of xenobiotics from the human body.
5. Outline the factors influencing responses to longitudinal exposures over the lifespan.
6. Determine the impact of toxicant pollutant emissions within the context of regulatory statutes on protecting the public from pollutant emissions.
7. Outline the potential health threat that natural and anthropogenic contaminants in the environment can pose to population health.
8. Compare the fate, transport, and uptake of zenobiotics.
9. Explain the physiological factors that influence human exposure and the uptake of chemical and biological environmental agents.
10. Critique human risk assessments.
11. Identify and explain individual (e.g., genetic, physiologic and psychosocial) and community (social, built, economic, race) susceptibility factors that heighten the risk for populations for adverse health outcomes from environmental toxicants.
12. Define, recognize, and explain environmental justice and its significance as a public health issue.
13. Use various risk management and risk communication approaches for environmental hazards.
14. Describe federal and state regulatory programs, guidelines and authorities relevant to environmental toxicology issues.

15. Construct partnerships with public health professionals (e.g., nurses, physicians, veterinarians, epidemiologists, biostatisticians) to address toxicological concerns.

Applicable Foundational Public Health Knowledge

1. Apply epidemiological methods to the breadth of settings and situations in public health practice
2. Select the quantitative and qualitative data collection methods appropriate for a given public health context
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate

Applicable MPH EHS Specialization Competencies

Upon completion of the course, MPH degree students with specialization in environmental health sciences should also be able to:

1. Explain the significance of the community and workplace environment to public health.
2. Outline the health threat that natural and anthropogenic contaminants in the environment can pose to population health.
3. Explain the physiological factors that influence human exposure and the uptake of chemical and biological environmental agents.
4. Identify and explain individual and community susceptibility factors that heighten the risk for populations for adverse health outcomes from environmental hazards.
5. Apply various risk assessment, risk management and risk communication approaches for environmental hazards.
7. Describe federal and state regulatory programs, guidelines and authorities relevant to environmental and occupational health.
8. Access state, federal, and local resources for assessing the environmental and occupational health.
9. Compare the principle components and influencing factors in the exposure continuum from source to disease.
10. Determine the role of exposure assessment in environmental and occupational health.

Applicable MS Competencies

Upon completion of the course, MS students should also be able to:

4. Conduct a research project using appropriate research methods and ethical approaches.
6. Communicate in writing and orally a research project's methods, results, limitations, conclusions and public health relevance.
7. Explain individual and community susceptibility and vulnerability factors that heighten the risk for populations for adverse health outcomes from environmental hazards.
8. Apply the environmental health paradigm (i.e. EHS model) to characterizing hazardous physical, chemical and biological agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls.
9. Work with various stakeholders and other professions to proactively and reactively address environmental toxicological regulatory policy and human health issues and concerns.

Applicable PhD Competencies

Upon completion of the course, MS students should also be able to:

6. Communicate in writing and orally a research project's purpose, methods, results, limitations, conclusions and public health relevance to both informed and lay audiences. (*Analyze via vignettes and case-studies the purpose, methods, results, limitations, conclusions and public health relevance of various exposure scenarios relevant to high-risk populations*)
7. Explain individual and community susceptibility and vulnerability factors that heighten the risk for populations for adverse health outcomes from environmental hazards.
8. Apply the environmental health paradigm (i.e. EHS model) to characterizing hazardous physical, chemical and biological agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls.

9. Work with various stakeholders and other professions to proactively and reactively address environmental and occupational regulatory policy and human health issues and concerns.

Text/Readings

The textbook is not required for this course as the text is available electronically via OSU libraries http://osu.worldcat.org/oclc/857713374. Readings are listed in the course outline below and will be posted on Carmen (www.carmen.osu.edu).

Klaassen, CD (8th Ed.) (2013). Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc. This book is available electronically via OSU libraries - http://osu.worldcat.org/oclc/857713374.

You may purchase the book via Amazon: ordering information: Publication Date: **May 29, 2013** | ISBN-10: **0071769234** | ISBN-13: **978-0071769235** | Edition: **8**

Required reading, web-based modules and supplementary material is indicated in the syllabus

Grading:
Students will be evaluated based on the following activities:

Activity	**Points**
Carmen Postings of Toxicology Related Event (1-time) End of Class Period Review (Top Hat)	**50** **100**
Exams (Total) 1 2 3	**500** 100 200 200
Small Group Activities (SGA 1-3) 1 200 Undergrad, 100 Grad 2 150 Undergrad, 150 Grad 3 **Graduate Students only (100)**	**350**
Total	**1000**

The final grade will be assigned according to the following scale:

Grade	**Percentage of**	**Meaning**

	Total Points (1000)	
A	100-93	Outstanding performance; consistently shown exceptional depth of understanding and/or capacity for creative application of course concepts.
A-	92.9-90	Very strong performance with demonstrated depth of understanding and/or ability to apply course concepts
B+	89.9-87	Performance at an expected level; work is complete and shows solid understanding and application of course concepts
B	86.9-83	Adequate performance; work is complete but shows some limitations in grasp or ability to apply course concepts
B-	82.9-80	Marginally acceptable; work is conducted only to meet minimum course requirements; student lacks or has limited understanding of key concepts and issues.
C+	79.9-77	Grades below B- indicate significant problems in understanding or applying course concepts and/or failure to meet stated course requirements.
C	76.9-73	
C-	72.9-70	
D+	69.9-67	
D	66.9-60	
E	<60	

Exams: There will be three exams representing course sections. The format of exams will be multiple choice, matching, and short answer. Each exam is weighted approximately according to the rubric above.

Exam 1. Principles of Toxicology, Disposition of Toxicants, Non-Organ Directed Toxicity

Applicable PhD Competencies

Ph.D. Competency 7 -Apply the environmental health paradigm (i.e. EHS model) to characterizing hazardous chemical agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls by answering questions presented in vignettes and case studies.

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Exam 2. Target Organ Toxicity (Liver, CNS, Respiratory, Skin, Heart and Vascular), Clinical Toxicology, Risk Assessment

Applicable PhD Competencies

Ph.D. Competencies 7 and 8- Explain individual and community susceptibility and vulnerability factors that heighten the risk for populations for adverse health outcomes from environmental hazards.
by answering questions presented in vignettes and case studies.

Final Exam. Special Applications in Toxicology, Epigenetics, Epidemiology (Comprehensive, but limited, plus a few questions from group presentations)

Applicable PhD Competencies

Ph.D. Competencies 6, 7, 8 and 9- Virtual work with various stakeholders and other professions to proactively and reactively address environmental and occupational regulatory policy and human health issues by answering questions presented in vignettes and case studies.

Ph.D. Competency 6- Analyze via vignettes and case-studies the purpose, methods, results, limitations, conclusions and public health relevance of various exposure scenarios relevant to high risk populations

End of Class Discussions (Top Hat): Part of Tuesday and Thursday classroom sessions will include a "discussion session" to promote inquiry and active student learning. The first 40-50 minutes of each session will be used for lecture to present relevant principles and concepts. The lecture will introduce, reinforce, and complement the required reading relating to the topic. The next 10-minutes will be used for the discussion to be comprised of students providing immediate feedback on the subject matter that was presented in the first 40-50 min of the session. This will take the form of providing answers to sets of 3-5 questions. We will use the **Top Hat app** portal for this activity.

Assignments:

Small Group Activities: Toxicological problems are often multidisciplinary in nature, requiring collaboration to achieve effective solutions. To provide experience with such collaborations, the course is structured so that students will have the opportunity to work with students from other colleges and specializations. Groups will be assigned during the first week of class so that such different fields of study are represented within each group. Groups will be involved in two activities.

- **Small Group Discussion.** Some classes will involve small group discussions centered on topical questions posed by the course coordinator. Each group will be required to turn in a one-page report at the end of class that includes the signature of each group member. Reports will be graded as pass/fail. Each student will be allowed a total of 20% fail or absences.
- **Group Project.** Groups will develop projects on topics that address toxicology issues of interest to the group. Topics must be submitted and approved as indicated on the rubric table by the indicated dates. Groups will present their projects at the end of the semester and post their PowerPoint slides to Carmen (specific details will be available by the end of February). General aspects of presentations will be covered on the final exam. Students will be required to develop and submit two multiple choice exam questions related to their project presentation. Presentations will be evaluated based on a general rubric:
  - General content: framing the question, setting context
  - Relevance to toxicological sciences
  - Clarity, grammar, and organization
  - Content, appropriate development of topic
  - Appropriate reliance on primary literature

Carmen

Course technology: *For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at https://ocio.osu.edu/help/hours, and support for urgent issues is available 24x7.*

- **Self-Service and Chat support:** http://ocio.osu.edu/selfservice
- **Phone:** 614-688-HELP (4357)
- **Email:** 8help@osu.edu
- **TDD:** 614-688-8743

Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Carmen

Necessary equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Please take the time to download the ***Top Hat*** app and use the join code **022664** for the PUBHEHS 5315 Principles of Toxicology course.

Carmen Postings of Toxicology Related Events: During the course of the semester, each student will be required to compose and submit **one** *original discussion entry* related to the toxicological sciences, and **one** *reply* to other students' posts. I will check and reply to messages in the discussion boards every **24 hours on school days**.

Class Policies: Attendance will be taken and therefore please do your best to attend class. The required end of class Top Hat reviews necessitate that you be in class to get full credit. If you know you will not be able to make it to class, please send me an e-mail. E-mail is my preferred mode of mass communication; please do check your e-mail and respond if necessary. I would prefer that you not use cell phones or pagers during class, unless you can make a strong case that it contributes in some concrete way to the session.

Exams: There are three exams associated with this course.

Written assignments: Your written assignments should be your own original work. In formal assignments, you should follow **APA** style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in--but no one else should revise or rewrite your work.

Reusing past work: In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.

Falsifying research or results: All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.

Collaboration and informal peer-review: The course does not require small group collaboration. While some group activity is may be required, remember that comparing answers is not permitted. If you're unsure about a particular situation, please feel free to ask the course director.

Office of Student Life: Disability Services. Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the Office of Student Life: Disability Services at 614-292-3307 in room 150 Pomerene Hall to coordinate reasonable accommodations for students with documented disabilities (http://www.ods.ohio-state.edu/).

Student Support. A recent American College Health Survey found stress; sleep problems, anxiety, depression, interpersonal concerns, death of a significant other and alcohol use among the top ten health impediments to academic performance. Students experiencing personal problems or situational crises during the semester are encouraged to contact OSU Counseling and Consultation Services (292-5766; http://www.ccs.ohio-state.edu) for assistance, support and advocacy. This service is free to students and is confidential.

Academic Integrity. Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University, the College of Public Health, and the Committee on Academic Misconduct (COAM) expect that all students have read and understood the University's *Code of Student Conduct* and the School's *Student Handbook*, and that all students will complete all academic and scholarly assignments with fairness and honesty. The *Code of Student Conduct* and other information on academic integrity and academic misconduct can be found at the COAM web pages (http://oaa.osu.edu/coam/home.html). Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct*, the *Student Handbook*, and in the syllabi for their courses may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Please note that the use of material from the Internet without appropriate acknowledgement and complete citation is plagiarism just as it would be if the source were printed material. Further examples are found in the *Student Handbook*. Ignorance of the *Code of Student Conduct* and the *Student Handbook* is never considered an "excuse" for academic misconduct.

If I suspect a student of academic misconduct in a course, I am obligated by University Rules to report these suspicions to the University's Committee on Academic Misconduct. If COAM determines that the student has violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in the course and suspension or dismissal from the University. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Course Schedule

Please note that additional course content (bold) is a mandatory reading or website to review.

Week No.	Session Dates (Lecturer)	Topics	Aligned Course Learning Objective(s)	Aligned Foundational Public Health Knowledge	Aligned Foundational & Specialization Competencies	Readings/ Other Assignments	Student Evaluation Activity for Assessment
1	Jan 8, 2019	Introduction to Course					Exam
		Principles of Toxicology I **(Hood)**	1-9, 14	1, 3, 4, 12,	MPH EHS –1,2 MS EPH- 1,2 PhD EPH – 7, 8	https://www.youtube.com/watch?v=E6KoMAbz1Bw Required Reading: Chapter 1 Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	
						Visit this website: (www.epa.gov/risk) and read through contents under the "" link	Exam, small group activity (SGA), group project presentations
2	Jan 10, 2019	Principles of Toxicology II **(Hood)**	Continued from Jan 9, 2018 Required Reading: Chapter 2; Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.				
3	Jan 15, 2019	Toxic Responses of the Liver **(Hood)**	1-9, 14	1, 2, 4, 12	MPH EHS – 4, 7 MS EPH – 4, 7 PhD EPH –7, 8	Required Reading: Chapter 13. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies	Exam Case Study/In-class Participation: in class discussion of the primary organ responsible for detoxification mechanisms.
4	Jan 17, 2019	Biotransformation of Xenobiotics **(Hood)**	1-9, 14	1, 2, 12	MPH EHS – 3, 4 MS EPH – 7, PhD EPH – 7, 8, 9	Required Reading: Chapter 6. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam Case Study/In-class Participation: in class discussion of

							the application of toxicology to assigned case study
		Top Hat Low Frequency Stakes Assessment during the last 10-minutes of class					
5	Jan 22, 2019	Chemical Agents and Pesticides **(Hood)**	1-9, 14	2, 3, 4	MPH EHS – 2, 5, MS EHS – 4, 7, PhD EHS –7,8	Required Reading: Chapter 22. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	SGA project presentations, In-class LFSA and answering exam questions presented as vignettes and case studies.
		Prepare and Submit Abstract for Historical Figure Small Group Activity Presentation					
6	Jan 24, 2019	Absorption, Distribution, Metabolism and Excretion, ADME **(Hood)**	1-9, 14	2, 3	MPH EHS – 9, 10 MS EHS – 4, 7, PhD EHS – 7, 8	Required Reading: Chapter 5 Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc. ADME video http://www.youtube.com/watch?v=CMRZqdrkCZw	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
7	Jan 29, 2018	**Top Hat Low Frequency Stakes Assessment during the last 10-minutes of class**					
		Developmental Toxicology **(Hood)**	1-9, 14	2, 3	MPH EHS – 7 MS EHS – 4, 7, 8 PhD EHS – 7, 8	Required Reading: Chapter 10 Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
			End of Material for Learning Experience 1				
8	Jan 31, 2019	Chemical Carcinogenesis **(Weghorst)**	2, 6	2, 4	MPH EHS – 2, 5 MS EHS –8 PhD EHS – 7, 8	Required Reading: Chapter 8. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam, Small group Activity presentations Low Frequency Stakes

							Assessment
		Top Hat Low Frequency Stakes Assessment during the last 10-minutes of class					
9	Feb 5, 2019	Learning Experience 1				Lockdown browser Carmen based	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
10	Feb 7, 2019	Toxic Responses of the Respiratory System **(Sun)**	2, 4, 7, 14	2, 4	MPH EHS –1, 2, 5 MS EHS – 7 PhD EHS –7,8,	Required Reading: Chapter 15. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
		Top Hat Low Frequency Stakes Assessment during the last 10-minutes of class					
11	Feb 12, 2019	Epidemiology in Toxicology **(Hyder)**	2, 4, 6, 7	2, 4	MPH EHS –2, 3, 4, 5 MS EHS – 7, 8 PhD EHS –7, 8	• http://www.youtube.com/watch?v=3aOEp7MeSV8 • Study Designs • How Excess Risk is Measured • Attributable Risk • Risk Factors vs. Causal Factors	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
12	Feb 14, 2019	Biological Toxins **(Weir)**	2	18, 20	MPH EHS – 5 MS EHS – 6,7 PhD EHS – 4, 7, 8	Required Reading: Chapter 32. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam, group project report, group project presentations
13	Feb 19, 2019	Risk Assessment **(Adetona)**	1, 2, 4, 6, 7, 13	2, 12	MPH EHS – 3, 4, 7 MS EHS – 4, 7, 9 PhD EHS – 4, 7, 8, 9	Required Reading: Chapter 4. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam, In-Class Simulation Case Study Exercise that is connected

						https://toxtutor.nlm.nih.gov/index.html and read the following links: "Introduction to Toxicology", "Dose and Dose Response", "Toxic Effects", "Interactions", "Toxicity Testing Methods"	to a contemporary public health issue that is evaluated by a rubric
14	Feb 21, 2019	Toxic Responses of the Skin **(Hood)**	1-9	2, 4	MPH EHS – 1, 2, 5 MS EHS – 9 PhD EHS – 8,	Required Reading: Chapter 19 Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
		Top Hat Low Frequency Stakes Assessment during the last 10-minutes of class					
15	Feb 26, 2019	Genetic Environmental Toxicology **(Hood)**	1-9, 14	2, 4	MPH EHS – 2, 3, 4, 5, 6, 8, 9,10 MS EHS – 7, 8 PhD EHS – 7, 8	Required Reading: Chapter 9. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc. **Environmental and Genetic Influences on Intelligence:** https://www.youtube.com/watch?v=bsdHDTIPPU8 **Genes and Environment:** https://www.youtube.com/watch?v=QJ__X1HEKeU	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
		End of Material for Learning Experience 2					
16	Feb, 28, 2019	Clinical Toxicology **(Bisesi)**	1	18, 20	MPH EHS – 5 MS EHS – 6, 9 PhD EHS – 6, 7,8	Required Reading: Chapter 12. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam, group project report, group project presentations
17	Mar 5, 2019	Historical Figure Presentation			7,8,9	Small Group Activity 1	In-Class Presentation
18	Mar 7, 2019	**Learning Experience 2**					
		SPRING BREAK March 11-15, 2019					
19			2, 4, 6, 7	2, 4	MPH EHS – 2,	Required Reading: Chapter 30.	Exam,

	Mar 19, 2019	Food Toxicology **(Lee)**			3, MS EHS – 7, 8 PhD EHS – 7, 8	Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
20	Mar 21, 2019	Toxic Responses of the Nervous System **(Hood)**	1-9	18, 20	MPH EHS – 5 MS EHS – 6, 9 PhD EHS – 6, 7, 8, 9	Required Reading: Chapter 16. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc. McCallister MM, Li Z, Zhang T, Ramesh A, Clark RS, et al. Revealing Behavioral Learning Deficit Phenotypes Subsequent to *in utero* Exposure to Benzo(a)pyrene. *Toxicological Sciences*. 2015 Sept; 13: 1-13. PMID: 26420751	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
21	Mar 26, 2019	Toxic Effects of Solvents and Metals **(Basta)**	5, 6	19, 21	MPH EHS – 5, 8 MS EHS – 6, 9 PhD EHS – 6, 7, 8, 9		Exam, In-Class Presentation
22	Mar 28, 2019	Toxic Responses of the Blood and Immune System **(Hood)**	1-9, 14	2, 4	MPH EHS – 1, 2, 5 MS EHS – 9 PhD EHS – 6,7,8, 9	Required Reading: Chapter 11 & 12. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
		Top Hat Low Frequency Stakes Assessment during the last 10-minutes of class					
23	April 2, 2019	Occupational Toxicology **(Adetona)**	2, 4, 6, 7	2, 4	MPH EHS – 2, 3, 4, 5, 6, 8, 9,10 MS EHS – 7, 8 PhD EHS – 7, 8, 9	Required Reading: Chapter 33. Klaassen. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam, In-Class Simulation Case Study Exercise that is connected to a

							contemporary public health issue that is evaluated by a rubric
24	April 4, 2019	Environmental Justice/Ethics **(Hood)**	1-15	18, 20	MPH EHS – 5 MS EHS – 6, 9 PhD EHS – 4, 6, 7, 8, 9	**EPA 20th Anniversary Environmental Justice Video Series:** https://www.youtube.com/watch?v=9hE3SyXr9bw Stokes et al., (2010) Blueprint for Preventing Environmental Injustice. *Journal of Health Care for the Poor and Underserved*; 21 (2010): 35–52.	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
25	Apr 9, 2019	Simulating Approaches to Analyzing Case Study Reports	5, 6, 15	19, 21	MPH EHS – 5, 8 MS EHS – 6, 9 PhD EHS – 6, 7, 8, 9		
26	Apr 11, 2019	Review of Applications in Toxicology	2, 4, 7	2, 4	MPH EHS – 1, 2, 5 MS EHS – 9 PhD EHS – 9	Required Reading: Chapter 15. Klaassen, CD. Casarett and Doull's Toxicology: The Basic Science of Poisons. The McGraw-Hill Companies, Inc.	Exam, In-Class Simulation Case Study Exercise that is connected to a contemporary public health issue that is evaluated by a rubric
27	Apr 16, 2019	Toxicology Exposure Disaster Presentations (SGA 2)	2, 4, 6, 7	2, 4	MPH EHS – 2, 3, 4, 5, 6, 8, 9,10 MS EHS – 7, 8 PhD EHS – 7, 8	• Guidance on Cumulative Risk Assessment of Pesticide Chemicals That Have a Common Mechanism of Toxicity. 2002 (Posted on Canvas)	Exam In-Class SGA Activity
28	Apr 18, 2019	Special Topics in Toxicology Presentations by Graduate Students (SGA 3)	5, 6	19, 21	MPH EHS – 5, 8 MS EHS – 6, 9 PhD EHS – 6, 9		Exam In-Class SGA Activity

29	Apr 24, 2019 8:00am-9:45an	**Final Learning Experience**

Grading rubric

Assignment	Points	Due Date*
Learning Experience One	**100**	**February 5, 2019**
I. Historical Figure/Seminal Event Exercise		
Submit Candidate's Name/Event with Justification	10 (10)	10:00am- February 5
Give 12-minute PowerPoint presentation	150 (60)	March 21, 2019
Answer Questions	20 (15)	
Pose 2 Questions (Total) for Other Presentations	20 (15)	March 21, 2019
Total Points for Historical Figure	**200 Undergrad 100 Graduate**	
Learning Experience Two	**200**	**March 7, 2019**
II. Toxicology Exposure Disaster Case Study		
Submit Candidate Chemicals with Justification	10 (10)	10:00pm – March 10
Submit Draft 1-page Abstract for Comments	20 (15)	March 10, 2019
Give 12-minute PowerPoint Presentation	160 (80)	April 11, 2019
Answer Questions	20 (15)	
Pose 2 Questions (Total) for Other Presentations	20 (15)	
Submit Revised 1 page Abstract	20 (15)	April 11, 2019
Total Points for Toxicology Exposure Disaster Case Study	**150 Undergrad 150G Graduate**	

III. **Special Topic Toxicology Case Study** – **Graduate Students Only**		
Submit Candidate Case Study with Justification	20	**April 9, 2019**
Submit Draft 1-page Abstract for Comments	20	10:00am – March 29
Give 30-minute PowerPoint Presentation	100	April 9, 2019
Answer Questions Pose 2 Questions (Total) for Other Presentations	20 20	
Submit Revised 1-page Abstract	20	N/A
Total Points for Special Topic Toxicology Case Study	**100 Graduate Only**	
Final Learning Experience	**200**	April 24, 2019 8:00-9:45am
Carmen Posting of Toxicology Related Event (1-time)	**50**	Throughout semester
End of Class Period Review (Top Hat)	**100**	Periodic
Total Points	**1000**	